

Original Research Article


# A clinical study of incidence, risk factor profile, and prognosis in cases of posterior circulation stroke

K. Babu Raj<sup>1</sup>, B. Nageswaran<sup>2\*</sup>

<sup>1</sup>Reader, Department of Medicine, Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India

<sup>2</sup>Second Year Post Graduate, Department of Medicine, Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India

\*Corresponding author email: [drnageswaran@gmail.com](mailto:drnageswaran@gmail.com)

	International Archives of Integrated Medicine, Vol. 5, Issue 9, September, 2018. Copy right © 2018, IAIM, All Rights Reserved. Available online at <a href="http://iaimjournal.com/">http://iaimjournal.com/</a>	
	ISSN: 2394-0026 (P)	ISSN: 2394-0034 (O)
	Received on: 20-08-2018	Accepted on: 29-08-2018
Source of support: Nil		Conflict of interest: None declared.
<b>How to cite this article:</b> K. Babu Raj, B. Nageswaran. A clinical study of incidence, risk factor profile, and prognosis in cases of posterior circulation stroke. IAIM, 2018; 5(9): 28-33.		

## Abstract

**Background:** The etiology of posterior circulation ischemia has been thought to be primarily due to local arterial atherosclerosis (large artery disease) and penetrating artery disease (lacunes). However, there is increasing evidence that cardiogenic embolization is more common than previously suspected and is responsible for 20-50% of posterior circulation strokes.

**Aim and objective:** To study the clinical manifestations, risk factor profile, and prognosis in this sample of patients.

**Materials and methods:** 54 cases of posterior circulation strokes, admitted to the Department of Medicine, Rajah Muthiah Medical College, and Hospital, Chidambaram, during the period from September 2016 to October 2017, who fulfilled the inclusion criteria, were taken up for the study.

**Results:** Out of 54 patients, 48.1% had hypertension, 37.0% had diabetes, 37.0% had tobacco abuse, 37.0% had alcohol abuse, 40.7% had dyslipidemia, 7.4% had TIA/Stroke, 11.1% had RHD, 27.8% had IHD and 7.4% had MVP as predisposing factors. Majority of the patients had hypertension as a risk factor followed by dyslipidemia. Many patients had multiple predisposing factors. 46.3% had their consciousness impaired, 59.3% had speech disturbances, 13.0% had cranial nerve involvement, 55.6% had motor disturbances, 13.0% had sensory disturbances, 48.1% had cerebellar signs, 37.0% had nystagmus and 44.4% had fundal changes. Majority of the patients had speech disturbances on clinical examination.

**Conclusion:** Majority of the patients had Hypertension (48.1%) as a risk factor followed by Dyslipidemia (40.7%). Many patients had multiple predisposing factors. There is an increased

association between coronary artery disease and posterior circulation strokes in our study (27.8%). Infratentorial lesions (50%) were more common than supratentorial lesions (38.9%) and both combined (11.1%). The mortality associated with posterior circulation strokes in our study is 16.7%. Majority of the patients had no disability (22.2%) or slight disability (18.5%).

## Key words

---

Stroke, Dyslipidemia, Coronary Artery Disease, Ischemia.

## Introduction

---

Posterior circulation ischemia can range from fluctuating brainstem symptoms, caused by intermittent insufficiency of the posterior circulation (so-called VBI), to the "locked-in syndrome," which is caused by a basilar artery or bilateral vertebral artery occlusion. Stroke syndromes of the posterior circulation account for approximately 20% of all strokes, with up to 20-60% of patients having an unfavorable outcome [1]. Basilar artery occlusion (BAO) represents 8-14% of all posterior circulation strokes and carries a mortality of over 90% [2]. The etiology of posterior circulation ischemia has been thought to be primarily due to local arterial atherosclerosis (large artery disease) and penetrating artery disease (lacunes). However, there is increasing evidence that cardiogenic embolization is more common than previously suspected and is responsible for 20-50% of posterior circulation strokes. The posterior circulation, unlike the intracranial portions of the anterior circulation, is prone to atherosclerosis as much as are other systemic arteries [3]. The posterior cerebral artery (PCA) supplies portions of the midbrain, the thalamus, the hippocampus, the medial temporal lobe, and the occipital lobe, including the visual cortex. The risk factors for posterior circulation strokes are the same as for other forms of cardiovascular disease. These factors may be either non-modifiable risk factors or medical stroke risk factors [4]. The non-modifiable risk factors include age, gender, race, family history of stroke or TIA, or a personal history of diabetes [5]. The medical stroke risk factors include hypertension, heart disease (such as atrial fibrillation or left ventricular hypertrophy), previous stroke or TIA, previous heart surgery, carotid artery disease, peripheral

vascular disease, and smoking. Intravenous thrombolysis is indicated in patients presenting soon enough for treatment initiation within 3 hours of symptom onset [6]. For patients with severe symptoms who are not eligible for intravenous thrombolysis, local or super-selective intra-arterial thrombolysis can be attempted within 24 hours of onset of symptoms. Antithrombotic therapy (heparin) is commonly used in clinical practice, based on uncontrolled trials using historical controls. Further study is needed to define the safest and most efficacious treatment modalities for the various types of posterior circulation strokes [7].

## Materials and methods

---

54 cases of posterior circulation strokes, admitted to the Department of Medicine, Rajah Muthiah Medical College, and Hospital, Chidambaram, during the period from September 2016 to October 2017, who fulfilled the inclusion criteria, were taken up for the study. All posterior circulation strokes were included during the study period. The diagnosis of posterior circulation was made when the patient had a clinical stroke syndrome compatible with involvement of posterior circulation territory with the help of clinical signs and symptoms and by means of classical syndromes like Claude's, Weber's, Balint's, Lateral medullary, Medial medullary, Locked in and top of basilar syndromes.

## Exclusion criteria

- If CT scan showed recent infarction, hemorrhage in the anterior circulation and other nonvascular lesions.
- History of Head injury
- Pregnancy

- Age < 18 years
- Electrolyte imbalance
- Patients on antidepressant drugs or anticonvulsants
- Bleeding Diathesis

## Results

**Table - 1** shows the distribution of the samples based on incidence. Out of 592 stroke patients, 54 (9.12%) patients had features of posterior circulation stroke based on the inclusion criteria and were taken up for the study.

**Table – 1:** Number of Stroke patients.

Cases	No. of patients	%
Stroke (Total)	592	100.0
Posterior circulation stroke	54	9.12

**Table – 2:** Predisposing factors.

Predisposing Factors	No. of patients (N=54)	%
Hypertension	26	48.1
Diabetes	20	37.0
Tobacco Abuse	20	37.0
Alcohol Abuse	20	37.0
Dyslipidemia	22	40.7
TIA/Stroke	4	7.4
RHD	6	11.1
IHD	15	27.8
MVP	4	7.4

**Table – 3:** Clinical manifestations at the time of presentation.

Clinical Manifestations	No. of patients (N=54)	%
Altered Sensorium	25	46.3
Vertigo	30	55.6
Headache	28	51.9
Vomiting	16	29.6
Convulsions	5	9.3
Ataxia	28	51.9
Speech Disturbances	33	61.1
Visual Disturbances	14	25.9
Motor Disturbances	31	57.4
Sensory Disturbances	8	14.8

**Table – 4:** Distribution of Lesions as per CT Scan.

	Features
<b>Infratentorial</b>	
1. Lateral Medulla	3.7
2. Pons	1.9
3. Mid Brain	1.9
4. Cerebellum	35.2
5. Brain Stem+ Cerebellum	7.4
<b>Supratentorial</b>	
1. Thalamic	7.4
2. Occipital	31.5
3. Thalamic+Occipital-Temporal	0
<b>Infra and Supratentorial</b>	
1. Pons + Occipital	3.7
2. Cerebellum + Occipital	1.9
3. Cerebellum + Thalamic + Occipital	0
4. Cerebellum + Pons + Occipital	1.9
5. Cerebellum + Midbrain + Thalamic	1.9
6. Thalamic + Medulla	1.9
7. Extensive vertebral artery occlusion + Pons + Occipital	0

**Table – 5:** Outcome based on the modified Rankin Score (mRS).

Modified Rankin Score	%
0	0
1	22.2
2	18.5
3	14.8
4	16.7
5	11.1
6	16.7

Out of 54 patients, 48.1% had hypertension, 37.0% had diabetes, 37.0% had tobacco abuse, 37.0% had alcohol abuse, 40.7% had dyslipidemia, 7.4% had TIA/Stroke, 11.1% had RHD, 27.8% had IHD and 7.4% had MVP as predisposing factors. Majority of the patients had hypertension as a risk factor followed by dyslipidemia. Many patients had multiple predisposing factors (**Table – 2**).

Out of 54 patients, 46.3% had altered sensorium, 55.6% had vertigo, 51.9% had a headache, 29.6% had vomiting, 51.9% had ataxia, 61.1% had speech disturbances, 25.9% had visual disturbances, 57.4% had motor disturbances, 14.8% had sensory disturbances and 9.3% had convulsions. Speech disturbances in the form of aphasia and dysarthria were the most common clinical manifestation followed by motor disturbances. Many patients had two or more clinical manifestations (**Table – 3**).

**Table – 4** shows the distribution of patients on the basis of the area of the lesion as per CT scan. Out of 54 patients, the majority of the patients (35.2%) had a lesion in the Cerebellum (Infratentorial) in isolation. Infratentorial lesions were more common than supratentorial lesions.

**Table – 5** shows the outcome based on the modified Rankin Score (mRS). Majority of the patients had no disability (22.2%) or slight disability (18.5%). 16.7% of patients expired before the end of the study period.

## Discussion

A majority of the patients with posterior circulation stroke were above the age of 70 (27.8%). There is a sharp rise in the incidence as the age goes higher up with the incidence being, 53.7% if the age was above 60 [8]. Hypertension was the most common attributable risk factor in our study with 48.1% of the patients having hypertension. However, the study conducted by Victor et al showed a higher association between hypertension and posterior circulation stroke (61%) [9]. A Study done by Pulsinelli WA, et al. have documented that posterior circulation atherosclerosis was more often associated with hypertension, diabetes, and metabolic derangements, whereas anterior circulation diseases were more closely associated with cigarette smoking and alcohol consumption. The correlation between dyslipidemia and posterior circulation stroke in our study (40.7%) was comparable with the study done by Uma, et al. (44.4%) [10]. There is an increased association

between coronary artery disease and posterior circulation strokes in our study (27.8%) compared to other studies. The risk factors such as hypertension, dyslipidemia, diabetes mellitus, smoking and alcohol abuse are the same for coronary artery disease and posterior circulation. Atherogenesis is a major pathological event that can be attributable to both. Speech disturbances were more common in our study (61.1%) compared to the studies done by Vuilleumier P, et al. (25%) [11]. This was because the majority of the case in our study had lesions related to the cerebellum and its connecting fibers. Speech disturbances included both dysarthria and aphasias. Motor disturbances which were common in our study (57.4%), was comparable by other studies was (63%) [12]. Motor disturbances included weakness of muscles, disorders of coordination and involuntary movements. Fundal changes in our study were (44.4%) which was slightly higher than the study done by Ralf L Sacco, et al. (37%) [13]. This is because of the rapid rise in the incidence of hypertension and diabetes. Isolated infratentorial lesions (50%) were more common than supratentorial lesions (38.9%) and both combined (11.1%), with the help of imaging modalities [14]. Among the infratentorial lesions, the majority was pure cerebellar (35.2%) and the overall incidence of cerebellar lesions was 50% [15]. The clinical presentation and evolution of various types of strokes, during onset, have grossly variable and overlapping symptoms and signs and hence, localization and classification of a specific subtype of a stroke syndrome (without imaging techniques) could not be done. The mortality of posterior circulation strokes is higher than that of the anterior circulation strokes. This is partly because the critical brainstem structures are affected and partly because of the lower sensitivity of screening imaging modalities like CT brain in the early detection of brainstem infarcts [16]. The mortality associated with posterior circulation strokes in our study was 16.7% which was similar to other studies done by Uma, et al. (17%). This was lower than studies done by Wilhelmsen L, et al. (25.6%), and Jones et al

(27.5%). Majority of the patients had no disability (22.2%) or slight disability (18.5%) in our study [17].

## Conclusion

The incidence of posterior circulation strokes was 9.12% of all strokes. The male to female ratio was 1.84:1 with 64.8% being males and 35.2% being females. 27.8% of the patients were above the age of 70 and 53.7% were above the age of 60. The incidence of posterior circulation stroke increased with age. Majority of the patients had Hypertension (48.1%) as a risk factor followed by Dyslipidemia (40.7%). Many patients had multiple predisposing factors. There is an increased association between coronary artery disease and posterior circulation strokes in our study (27.8%). Speech disturbances (61.1%) in the form of aphasia and dysarthria were the most common clinical manifestation followed by motor disturbances (57.4%). Many patients had two or more clinical manifestations. The other common clinical manifestations were Vertigo (55.6%), headache (51.9%) and ataxia (51.9%). Fundal changes in our study were (44.4%) because of the rapid rise in the incidence of hypertension and diabetes. Infratentorial lesions (50%) were more common than supratentorial lesions (38.9%) and both combined (11.1%). The mortality associated with posterior circulation strokes in our study is 16.7%. Majority of the patients had no disability (22.2%) or slight disability (18.5%).

## References

1. World Health Organisation (1978). *Cerebrovascular Disorders* (Offset Publications). Geneva: World Health Organization. ISBN 92-4-170043-2. OCLC 4757533.
2. Easton JD, Saver JL, Albers GW, Alberts MJ, Chaturvedi S, Feldmann E. *Surgery and Anesthesia; Council on Cardiovascular Radiology and Intervention; Council on Cardiovascular Nursing; and the Interdisciplinary Council on Peripheral Vascular Disease*. *Stroke*, 2009; 40: 2276–2293.
3. Cole W. A *Physico-Medical Essay Concerning the Late Frequency of Apoplexies Together With a General Method of Their Prevention and Cure: In a Letter to a Physician*. Oxford, United Kingdom; The Theater; 1869. Reprinted by: New York, NY: Classics of Neurology and Neurosurgery Library; 1995.
4. Hippocrates. *The Genuine Works of Hippocrates: Translated From the Greek With a Preliminary Discourse and Annotations by Francis Adams*. Adams, trans. Baltimore, MD: Williams & Wilkins; 1939.
5. A classification and outline of cerebrovascular diseases, II. *Stroke*, 1975; 6: 564–616.
6. Albers GW, Caplan LR, Easton JD, Fayad PB, Mohr JP, Saver JL, Sherman DG. TIA Working Group. Transient ischemic attack: proposal for a new definition. *N Engl J Med.*, 2002; 347: 1713–1716.
7. Becker KJ. Vertebrobasilar ischemia. *New Horizons*, 1997; 5: 305-315.
8. Caplan L. Posterior circulation ischemia: then, now, and tomorrow. The Thomas Willis Lecture-2000. *Stroke*, 2000; 31: 2011-2023.
9. Victor M Rae. *Cerebrovascular Disease*, in anonymous Adam's and Victor's *Principles of Neurology*. New York, NY, McGraw Hill; 2000, p. 821-851.
10. Pulsinelli WA. The ischemic penumbra in stroke. *Sci Med.*, 1995; 1: 16-25.
11. Vuilleumier P, Bogousslavsky J, Regli F. Infarction of the lower brainstem. Clinical, aetiological and MRI-topographical correlations. *Brain*, 1995; 118: 1013-1025.
12. American Heart Association. 2000 Heart and Stroke Statistical Update. 2000. Dallas, TX. (GENERIC) Ref Type: Pamphlet.

K. Babu Raj, B. Nageswaran. A clinical study of incidence, risk factor profile, and prognosis in cases of posterior circulation stroke. IAIM, 2018; 5(9): 28-33.

13. Ralf L Sacco, Kargman S, Qiong Gu, et al. Race-ethnicity and determination of intracranial atherosclerotic cerebral infarction. The Northern Manhattan Stroke Study. Stroke, 1995; 26: 14-20.
14. Broderick J, Brott T Tomsick, Leach A. Lobar hemorrhage in the elderly. The undiminishing importance of HT. Stroke, 1993; 24: 49-51.
15. Wolf PA, Kannel WB, McNamara PM, Gordon T. The role of impaired cardiac function in atherothrombotic brain infarction; The Framingham study. Am J of Public health, 1973; 63: 52-58.
16. Colditz G A, Bonita R, Stanpher M J, et al. Cigarette smoking and risk of stroke in middle-aged women. NEJM, 1988; 318: 937.
17. Wilhelmsen L, Svardsudd K, Korsan Bengsten K, et al. Fibrinogen as a risk factor for stroke and MI. NEJM, 1984; 311: 501-505.